



ELECTRONIC TUBE REFERENCE

12GN6

Voltage - Radio Detector Converter electronic tube

CONSOLIDATED TECHNICAL DATA

2 SECTIONS

CONSTRUCTION

DIODE-PENTODE

Remote-cutoff RF/IF pentode combined with a demodulator diode on a common cathode for receiver amplification and detection.

GENERAL CHARACTERISTICS

BASE DESIGNATION	7FW	BASE PINS	7
NOMINAL HEATER	12.6 V / 150 mA	PARALLEL HEATER	– / –
HEATING	Indirect	SERIES OPERATION	Not specified
CATHODE ARRANGEMENT	Common cathode	SECTION CONSTRUCTION	Dissimilar

SECTION RATINGS

SECTION1 Pentode	
PLATE RESISTANCE	250000 Ω
TRANSCONDUCTANCE	0.0043 S
MAXIMUM PLATE VOLTAGE	300 V
MAXIMUM SCREEN VOLTAGE	300 V
MAXIMUM PLATE DISSIPATION	3 W
MAXIMUM SCREEN DISSIPATION	0.6 W
<i>Remote-cutoff pentode section.</i>	

SECTION2 Diode	
NOMINAL OUTPUT CURRENT	1 mA
<i>Demodulator diode sharing the cathode with the pentode.</i>	

12GN6 — Remote-Cutoff Pentode and Demodulator Diode

The **12GN6** is a multi-unit miniature vacuum tube containing a high-gain, remote-cutoff pentode and a single demodulator diode sharing a common cathode. It is designed primarily for service in television and radio receivers as a high-gain radio-frequency (R.F.) or intermediate-frequency (I.F.) amplifier and demodulator.

Construction, Heater, and Pinout

The 12GN6 is constructed in a T-5 1/2 glass bulb utilizing a miniature button 7-pin base (basing designation **7FW**). The tube features a coated unipotential cathode that is shared between the pentode and diode sections. It is designed to operate in any mounting position.

The physical dimensions of the T-5 1/2 envelope are:

- **Maximum overall length:** 2-1/4 inches
- **Maximum seated height:** 2 inches
- **Maximum diameter:** 3/4 inch

Heater Specifications

The heater is designed for either AC or DC operation. The nominal heater characteristics are:

- **Heater Voltage:** 12.6 V
- **Heater Current:** 0.15 A
- **Calculated Heater Power:** 1.89 W (calculated as $12.6\text{ V} \times 0.15\text{ A}$)

Pin Connections

The bottom view of the 7-pin base provides the following electrode connections:

Pin	Connection
1	Grid No. 1 (Control Grid)
2	Cathode, Grid No. 3 (Suppressor Grid), and Internal Shield
3	Heater
4	Heater
5	Diode Plate
6	Grid No. 2 (Screen Grid)
7	Plate (Anode)

Direct Interelectrode Capacitances

The interelectrode capacitances of the 12GN6 are specified both with and without an external shield. When an external shield is employed, it is connected to Pin 2 (which ties to the cathode, suppressor grid, and internal shield).

Capacitance Parameter	With External Shield	Without Shield
Grid No. 1 to Plate (Max.)	0.0035 μF	0.0035 μF
Input (Grid No. 1 to Cathode, Heater, Screen Grid, and Suppressor Grid)	5.5 μF	5.5 μF
Output (Plate to Cathode, Heater, Screen Grid, and Suppressor Grid)	5.5 μF	5.0 μF
Coupling Diode Plate to Grid No. 1 (Max.)	0.05 μF	0.05 μF

Maximum Ratings

The maximum ratings for the 12GN6 are established under the Design Center System. These limits represent the maximum values that the manufacturer recommends should not be exceeded under any normal operating conditions:

Rating	Value
Maximum Plate Voltage	300 V
Maximum Screen-Supply Voltage (Grid No. 2)	300 V
Maximum Positive Grid No. 1 Voltage	0 V
Maximum Negative Grid No. 1 Voltage	50 V
Maximum Plate Dissipation	3.0 W
Maximum Screen Dissipation	0.6 W
Maximum Diode Current (Continuous Operation)	1.0 mA
Maximum Heater-Cathode Voltage:	
- Heater Positive with respect to Cathode (Total DC plus Peak)	100 V
- Heater Negative with respect to Cathode (Total DC plus Peak)	100 V

Typical Operating Conditions and Class A1 Characteristics

The pentode section of the 12GN6 is typically operated as a Class A1 amplifier. The suppressor grid (Grid No. 3) must be connected directly to the cathode at the socket (Pin 2). The manufacturer specifies two typical operating points:

Parameter	Operating Point I	Operating Point II
Plate Voltage	100 V	250 V
Screen Voltage (Grid No. 2)	100 V	100 V
Cathode-Bias Resistor	68 Ω	68 Ω
Plate Resistance (Approx.)	0.25 M Ω	1.0 M Ω
Transconductance	4,300 μ mhos	4,400 μ mhos
Plate Current	10.8 mA	11.0 mA
Screen Current	4.4 mA	4.2 mA
Grid No. 1 Voltage (Approx.) for $g_m = 40 \mu$ mhos	-20 V	-20 V
Average Diode Current at 10 V D.C.	1.5 mA	1.5 mA

Remote-Cutoff and Diode Performance

The remote-cutoff characteristic of the pentode section is demonstrated by the grid bias required to reduce transconductance. At both the 100 V and 250 V plate operating points, applying an approximate negative bias of -20 V to Grid No. 1 reduces the transconductance (g_m) from its nominal values (4,300 or 4,400 μ mhos) down to a very low level of 40 μ mhos. This wide cutoff range allows effective automatic gain control (AGC) in R.F. and I.F. stages without causing severe cross-modulation or distortion on strong signals.

The demodulator diode shares the common cathode with the pentode. Under typical operating conditions, the diode section exhibits an average diode current of **1.5 mA** when a direct-current potential of **10 V D.C.** is applied. The maximum continuous diode current rating is restricted to **1.0 mA** under normal operation, ensuring long-term stability and preventing excessive emission wear on the shared cathode structure.

Related Designations

The 12GN6 is closely related to the **6GN6**. Except for their heater characteristics (voltage, current, and warm-up time), the two tubes are identical in construction, ratings, and electrical characteristics. The

6GN6 is designed for 6.3 V heater circuits, whereas the 12GN6 is designed for 12.6 V heater circuits, making them non-interchangeable without circuit modifications to the heater supply.

Technical Summary

The **12GN6** is a 7-pin miniature, indirectly heated vacuum tube combining a remote-cutoff pentode and a demodulator diode on a common cathode. Operating with a **12.6 V, 0.15 A** heater, it provides high-gain R.F. and I.F. amplification alongside demodulation capabilities in a single compact envelope. With a maximum plate rating of **300 V** and a plate dissipation limit of **3.0 W**, the pentode section delivers a transconductance of **4,300 to 4,400 μmhos** under typical Class A1 conditions, while its remote-cutoff design allows for smooth automatic gain control.



SOURCE OPERATING CONDITIONS

[SOURCE PDF](#)

1961 Tung Sol

Published test conditions and operating points. Values on this page are preserved as reported by this source.

1961 TUNG SOL

Section 1 · Pentode

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Heater voltage	12.6 V	—
Heater current	150 mA	—

CAPACITANCE		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Input capacitance	5.5 pF	—

1961 TUNG SOL

Section 2 · Diode

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Maximum diode current	1 mA	Continuous



SOURCE OPERATING CONDITIONS

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1966 Tung Sol Electronic Tubes 3 of 4

Published test conditions and operating points. Values on this page are preserved as reported by this source.

1966 TUNG SOL ELECTRONIC TUBES 3 OF 4

Section 1 · Pentode

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Plate voltage	250 V	ClassA

PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Screen voltage	100 V	ClassA
Cathode-bias resistor	68 ohm	ClassA
Plate current	11 mA	ClassA
Screen current	4.2 mA	ClassA

CHARACTERISTIC		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Plate resistance	1000000 ohm	ClassA
Transconductance	4400 uS	ClassA
Grid #1 voltage at transconductance 40 uS	-20 V	—

CAPACITANCE		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Grid #1-to-plate capacitance	0.0035 pF	—
Input capacitance	5.5 pF	—
Output capacitance	5 pF	—
Diode-plate to grid coupling capacitance	0.05 pF	—

1966 TUNG SOL ELECTRONIC TUBES 3 OF 4

Section 2 · Diode

CHARACTERISTIC		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Average diode current at 10 V DC	2.5 mA	Demodulator

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